

D. MEASUREMENT

Content Standard: Students in Wisconsin will select and use appropriate tools (including technology) and techniques to measure things to a specified degree of accuracy. They will use measurements in problem-solving situations.

Rationale: Measurement is the foundation upon which much technological, scientific, economic, and social inquiry rests. Before things can be analyzed and subjected to scientific investigation or mathematical modeling, they must first be quantified by appropriate measurement principles. Measurable attributes include such diverse concepts as voting preferences, consumer price indices, speed and acceleration, length, monetary value, duration of an Olympic race, or probability of contracting a fatal disease.

Performance Standards: By the end of grade four, students will:	Sample Alternate Performance Indicators: (1-3 per standard)	Sample Performance Activities/Tasks: (1-2 per indicator)	Sources of Data
D.4.1. Recognize and describe measurable attributes, such as length, liquid capacity, time, weight (mass), temperature, volume, monetary value, and angle size, and identify the appropriate units to measure them[1]	1. Demonstrate, show, and use measurable attributes[2] 2. Identify and describe components of a whole[2]	1.a. Measure the length, width, and weight of an object with appropriate units(1) 1.b. State appropriate change in a situation 2.a. Calculate the area of an irregular shape (e.g., trapezoid or triangle)(1) 3.a. Identify the time necessary to travel a given distance at a given speed(1) 3.b. Plan a trip to a foreign country and calculate distance, flying time, and stopover time using airline time tables, maps, and international time zones Present problems orally in L_1 or L_2 (4)	
D.4.2. Demonstrate understanding of basic facts, principles, and techniques of measurement, including[2] <ul style="list-style-type: none"> • appropriate use of arbitrary 	1. Use standard measurement tools[1]	1.a. Use appropriate measuring tools and units for a specific task(2) 1.b. Find the area of the student's classroom and estimate the cost of carpeting or tiling it using current prices from local	

<p>and standard units (metric and US Customary)</p> <ul style="list-style-type: none"> • appropriate use and conversion of units within a system (such as yards, feet, and inches; kilograms and grams; gallons, quarts, pints, and cups) • judging the reasonableness of an obtained measurement as it relates to prior experience and familiar benchmarks 	<p>2. Demonstrate conversion of standard units of measurement[2]</p> <p>3. Decide appropriate units to obtain a reasonable measurement[2]</p>	<p>flyers or newspapers (3)</p> <p>2.a. Find a shape's area in metric units and convert it to U.S. Customary units. Find the area and perimeter of the student's classroom(2)</p> <p>3.a. List the variety of possible units to use in activity in D.4.2.-1.b.(2)</p>	
D.4.3. Read and interpret measuring instruments (e.g., rulers, clocks, thermometers)[1]	1. Demonstrate the use of measuring instruments (e.g., rulers, clocks, thermometers, and weight scales)[1]	1.a. Measure different classroom objects in both inches (2)	
<p>D.4.4. Determine measurements directly by using standard tools to these suggested degrees of accuracy[1]</p> <ul style="list-style-type: none"> • length to the nearest half-inch or nearest centimeter • weight (mass) to the nearest ounce or nearest 5 grams • temperature to the nearest 5 degrees • time to the nearest minute • monetary value to dollars and cents • liquid capacity to the nearest fluid ounce 	1. Show understanding of the importance of accurate measurement by using standard tools (the use of smaller units produces more precise measurement)[2]	<p>1.a. Measure the length of the student's book in inches and centimeters and write the measurement in the nearest half-inch and centimeter(1)</p> <p>1.b. Measure the weight of an object in ounces and grams(1)</p> <p>1.c. Use a thermometer to measure the temperatures in a freezer and a room to the nearest five degree(1)</p>	
D.4.5. Determine measurements by using basic	1. Estimate and/or calculate perimeter, area, volume, distance, weight, money,	1.a. Find the perimeter and area of a drawn rectangular figure with the side measurements indicated(1)	

relationships (such as perimeter and area) and approximate measurements by using estimation techniques[2]	time, and temperature[2]		
Performance Standards: By the end of grade eight, students will:	Sample Alternate Performance Indicators: (1-3 per standard)	Sample Performance Activities/Tasks: (1-2 per indicator)	Sources of Data
D.8.1. Identify and describe attributes in situations where they are not directly or easily measurable (e.g., distance, area of an irregular figure, likelihood of occurrence)[2]	1. Compare metric and U.S. Customary units[2]	1.a. Given an irregular shape, draw lines to form triangles or rectangles. Measure distances and calculate the total area(2) 1.b. Demonstrate area using a grid(1)	
D.8.2. Demonstrate understanding of basic measurement facts, principles, and techniques including the following[2] <ul style="list-style-type: none"> • approximate comparisons between metric and U.S. Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile) • knowledge that direct measurement produces approximate, not exact, measures • the use of smaller units to produce more precise measures 	1. Show that the use of smaller units produces more precise measures[2]	1.a. Select an object, measure it in metric units, and estimate it in U.S. Customary units(2) 1.b. Measure an object to the nearest tenth of a metric unit(1)	
D.8.3. Determine measurement directly using standard units (metric and US Customary) with	1. Show understanding of the importance of accurate measurement and consequences and consequences	1.a. Roleplay a result of taking an overdose of medicine (e.g., taking two tablespoons of medicine instead of two teaspoons)(3)	

<p>these suggested degrees of accuracy[1]</p> <ul style="list-style-type: none"> lengths to the nearest millimeter or 1/16 of an inch weight (mass) to the nearest 0.1 gram or 0.5 ounce liquid capacity to the nearest milliliter angles to the nearest degree temperature to the nearest degree Centigrade or degree Fahrenheit elapsed time to the nearest second 	<p>of inaccurate measurement using metric and U.S. Customary tools (the use of smaller units produces more precise measurement)</p>	<p>1.b. Show the result of mixing the wrong amount of by using pictures, words, roleplay, or expression(3)</p>	
<p>D.8.4. Determine measurements indirectly using[2]</p> <ul style="list-style-type: none"> estimation conversion of units within a system (e.g., quarts to cups, millimeters to centimeters) ratio and proportion (e.g., similarity, scale drawings) geometric formulas to derive lengths, areas, volumes of common figures (e.g., perimeter, circumference, surface area) the Pythagorean relationship geometric relationships and properties for angle size (e.g., parallel lines and 	<p>1. Demonstrate indirect measurements by using estimation, conversion, ratio and proportion, and formulas[2]</p> <p>2. Demonstrate basic skill in recognizing and drawing geometric shapes and formulas[1]</p>	<p>1.a. Solve problems of the (2)</p> <p>2.a. Solve problems of the following type: Bill is going to build a fence around his backyard. His backyard is 35 feet long and 25 feet wide. How much fence will Bill need?(1)</p>	

transversals; sum of angles of a triangle; vertical angles)			
Performance Standards: By the end of grade eight, students will:	Sample Alternate Performance Indicators: (1-3 per standard)	Sample Performance Activities/Tasks: (1-2 per indicator)	Sources of Data
D.12.1. Identify, describe, and use derived attributes e.g., density, speed, acceleration, pressure) to represent and solve problem situations	1. Identify, describe, and use derived attributes (e.g., density, speed, acceleration, and pressure) to represent and solve problem situations	1.a. Solve problems of the following type: Marcia is on a trip to Chicago, 525 miles away from her home. She began at noon and by 3:00 p.m. had traveled 156 miles. If she continues at the same speed for the rest of the trip, at what time will she arrive in Chicago?	
D.12.2. Select and use tools with appropriate degree of precision to determine measurements directly within specified degrees of accuracy and error (tolerance)	1. Devise and use measurement tools and units to solve real-world situations	1.a. Plan to redecorate the student's room at home (paint the wall, carpet the floor, and tile the ceiling) <ul style="list-style-type: none"> • estimate the areas • use appropriate tools and units to measure room dimensions • calculate the areas • make a scale drawing of the room (Using a geometry sketch pad is recommended.) • calculate the total cost using prices from local advertisements • compare prices from at least two different stores, decide where to buy, and justify the answer 	
D.12.3. Determine measurements indirectly, using <ul style="list-style-type: none"> • estimation • proportional reasoning, including those involving squaring and cubing (e.g., reasoning that areas of circles are proportional to the squares of their radii) • techniques of algebra, geometry, and right triangle trigonometry 	1. Demonstrate indirect measurements by using estimation, conversion, proportional reasoning, and formulas in application.	1.a. Plan to build a swimming pool <ul style="list-style-type: none"> • estimate the areas: width, length, and depth • use appropriate units to draw and find area, perimeter, and volume • calculate the total cost 1.b. Solve problems of the following type: I ordered 2 pizzas. The 12-inch pizza cost \$10.00. The 14-inch pizza cost \$12.00. Which is a better buy and why?	

<ul style="list-style-type: none">• formulas in applications (e.g., for compound interest, distance formula)• geometric formulas to derive lengths, areas, or volumes of shapes and objects (e.g., cones, parallelograms, cylinders, pyramids)• geometric relationships and properties of circles and polygons (e.g., size of central angles, area of a sector of a circle)• conversion constants to relate measures in one system to another (e.g., meters to feet, dollars to Deutschmarks)			
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